

## STUDIES ON NEW ENGLAND AGARICS II

HOWARD E. BIGELOW

In the continuing survey of the mycoflora of New England and adjacent areas, several uncommon species belonging to the genera *Stropharia* and *Psilocybe* have been collected. These species are seldom reported and described completely, and there are little data available about their distribution in North America. *Stropharia coronilla*, *S. hardii*, *Psilocybe thrausta*, *P. coprophila*, *P. merdaria*, *P. bullacea*, and *P. rhombispora* are described below.

The colors given in quotation marks in the descriptions are those of Ridgway (1912).

Acknowledgment is made to the National Science Foundation for grant G 19534 under which some of the research was made possible. I am also grateful to Dr. Richard P. Korf, Curator of the mycological collections at Cornell University for the loan of Atkinson collections.

***Stropharia coronilla*** (Fries) Quélet, Champ. Jura et Vosges, p. 255. 1872. Figures 1-3.

Pileus 1.3-5 cm broad, convex or hemispheric at first with an incurved and narrowly inrolled margin, remaining so for some time but becoming unrolled and vertical, not striate, expanding finally to broadly convex, surface moist and dull when fresh, sometimes rather shining when partially dried, glabrous and smooth, light orange yellow (about "ochraceous buff") young and fresh, paler in age (near "cream buff"); context white, moderately thick on disc, pliable. Odor rather fragrant. Taste not distinctive.

Lamellae adnate or rounded at times to sinuate or emarginate, close, broad (3-7 mm), whitish soon pinkish vinaceous, then vinaceous gray and finally chocolate brown, edges crenate, whitish marginate.

Stipe 2.5-4 cm long, apex 3.5-9 mm thick, tapering downward to narrowed base, 2-7 mm, surface glabrous, solid stuffed, often curved, white.

Annulus superior, white with dark striations on upper side, thick, persistent.

Spores 7-8(-8.5) × 5-5.5 μm, elliptic to ovate, one side flattened

in side view, smooth, brown in KOH, wall thickened, apiculus hyaline and small, apical pore present, truncate at times, deposit blackish brown. Basidia  $17.5\text{--}28 \times 7\text{--}8 \mu\text{m}$ , 4-spored. Cheilocystidia  $22\text{--}28 \times 7.5\text{--}12.5 \mu\text{m}$ , subsaccate to cylindrical, clavate and pedicellate or clavate and bulbous, smooth, walls thin (empty appearing and not with granular content like basidioles). Pleurocystidia of two types: (1) rostrate to mucronate,  $27\text{--}30 \times 8.5\text{--}10 \mu\text{m}$ , with crystalline refractive bodies (chrysocystidia), hyaline to bright yellow, (2) irregular basidioid,  $23\text{--}26.5 \times 6.5\text{--}7.5 \mu\text{m}$ , contents homogeneous, walls smooth and thin. Pileus: cutis hyphae mostly cylindrical,  $3\text{--}8.5\text{--}(16) \mu\text{m}$  diam, golden yellow in KOH, pigment distinctly encrusted, often appearing scalariform, some hyphae smooth, occasional end cells protruding beyond surface; context hyaline, hyphae cylindrical to inflated,  $11\text{--}25 \mu\text{m}$  diam, cells often short. Hymenophoral trama of subparallel to parallel hyphae, mostly cylindrical,  $5\text{--}9\text{--}(15) \mu\text{m}$  diam, narrow near subhymenium, broad in mediostratum. Oleiferous hyphae present,  $5\text{--}9 \mu\text{m}$  diam. Clamp connections present.

Gregarious to subcespitate on lawn. Fall.

MATERIAL EXAMINED. **Massachusetts:** *Bigelow 11558* (collected by H. Hinds) (MASS).

Smith (1949) notes that the pileus may be viscid if very wet conditions prevail at the time of fruiting. Under such circumstances, it would be possible to confuse *Stropharia coronilla* with the viscid *S. semiglobata*. However, the latter grows attached to manure, and the stipe lacks a persistent annulus. The spores are considerably larger ( $15\text{--}19 \times 7\text{--}9 \mu\text{m}$ ) than those of *S. coronilla*.

Smith (1949) and Hesler (1960) have illustrated the appearance of fresh specimens of *Stropharia coronilla*.

***Stropharia hardii*** Atkinson, Jour. Mycol. **12**: 194. 1906. Figures 4–6.

Pileus (2–)4.5–7 cm broad, hemispheric to convex at first with an incurved margin attached to the partial veil, becoming convex to broadly convex, finally plane, margin even and slightly appendiculate with white veil remains, surface smooth, appressed fibrillose on the disc under a hand lens, matted fibrillose to fibrillose scaly near margin, opaque, subviscid at first soon only moist, finally dry, disc

orangish ("warm buff," "ochraceous buff"), becoming paler and more yellowish toward the margin ("maize yellow"); context moderately thick except at edge, white, firm. Odor slightly of green corn or raw potato. Taste mild, pleasant and rather nutty.

Lamellae adnexed or adnate, seceding and rounded in age, close to crowded, narrow to medium broad (3–7 mm), not forked nor intervenose, whitish at first (near "tulleul buff"), darkening to "avel-laneous" then "drab," finally to dark purplish brown, edges crenate or fimbriate under a lens, slightly undulate.

Stipe 3.5–8 cm long, apex 8–15 mm thick, base slightly enlarged (up to 2 cm) and tapering gradually upward, blunt in soil, base with a few rhizoids, solid and white within but becoming cavernous from insects, surface whitish, silky to scabrous below annulus, dull and smooth above.

Annulus superior, whitish, membranous, narrow ( $\pm 4$  mm), ridged on top, cottony underneath, edge rather ragged.

Spores  $5.5\text{--}7 \times 4\text{--}5 \mu\text{m}$ , ovate, smooth, ochraceous brown in KOH, wall thickened, small hyaline apiculus, apical pore minute, deposit "cinnamon drab," "benzo brown," "olive brown," "bister." Basidia  $15\text{--}26 \times 5\text{--}7.5 \mu\text{m}$ , 4-spored. Cheilocystidia  $32\text{--}40 \mu\text{m}$  long,  $8\text{--}16 \mu\text{m}$  broad, saccate to broadly cylindrical or subclavate, pedicellate, mucronate at times, smooth, thin walled, with interior crystal at times (chrysocystidia). Pleurocystidia  $28\text{--}33 \mu\text{m}$  long,  $8\text{--}11 \mu\text{m}$  broad, mucronate to papillate or mammillate, broadly cylindrical to subclavate, usually with interior refractive crystal or two, smooth, thin walled. Pileus: cutis bright ochraceous to golden yellow in KOH, pigment distinctly encrusted, hyphae cylindrical to inflated,  $2\text{--}14 \mu\text{m}$  diam, cells often short; context yellowish, hyphae mostly inflated,  $7.5\text{--}26 \mu\text{m}$  diam, cells often short, walls sinuous at times. Hymenophoral trama of parallel hyphae, yellowish in KOH, hyphae mostly somewhat inflated,  $3\text{--}21 \mu\text{m}$  diam, cells short. Oleiferous hyphae present. Clamp connections present.

Gregarious. On humus under hemlock and hardwoods. August and September.

MATERIAL EXAMINED. **Maine:** *Bigelow 16652* (MASS); **Massachusetts:** *Bigelow 9798, 12382, 15808, & 17492* (MASS); **New Hampshire:** *Bigelow 17501* (MASS); **Ohio:** *Hard 8*, 17 Oct 1906, Chillicothe (TYPE) (CUP 20118).

In the field *Stropharia hardii* could be mistaken for *Pholiota schraderi*, or vice versa, and it is necessary to check all specimens microscopically. *Pholiota schraderi* has longer spores,  $6.5-8(-10) \times 4-4.5(-5.5) \mu\text{m}$ , and its cystidia are larger,  $40-60(-78) \times 9-20 \mu\text{m}$ , according to Smith and Hesler (1968).

Photographs of *Stropharia hardii* may be found in Smith and Hesler (1940) and Hesler (1960).

**Psilocybe thrausta** (Schulz.) Bon, Docums mycol. **4**: 17. 1974. Figures 10 & 11.

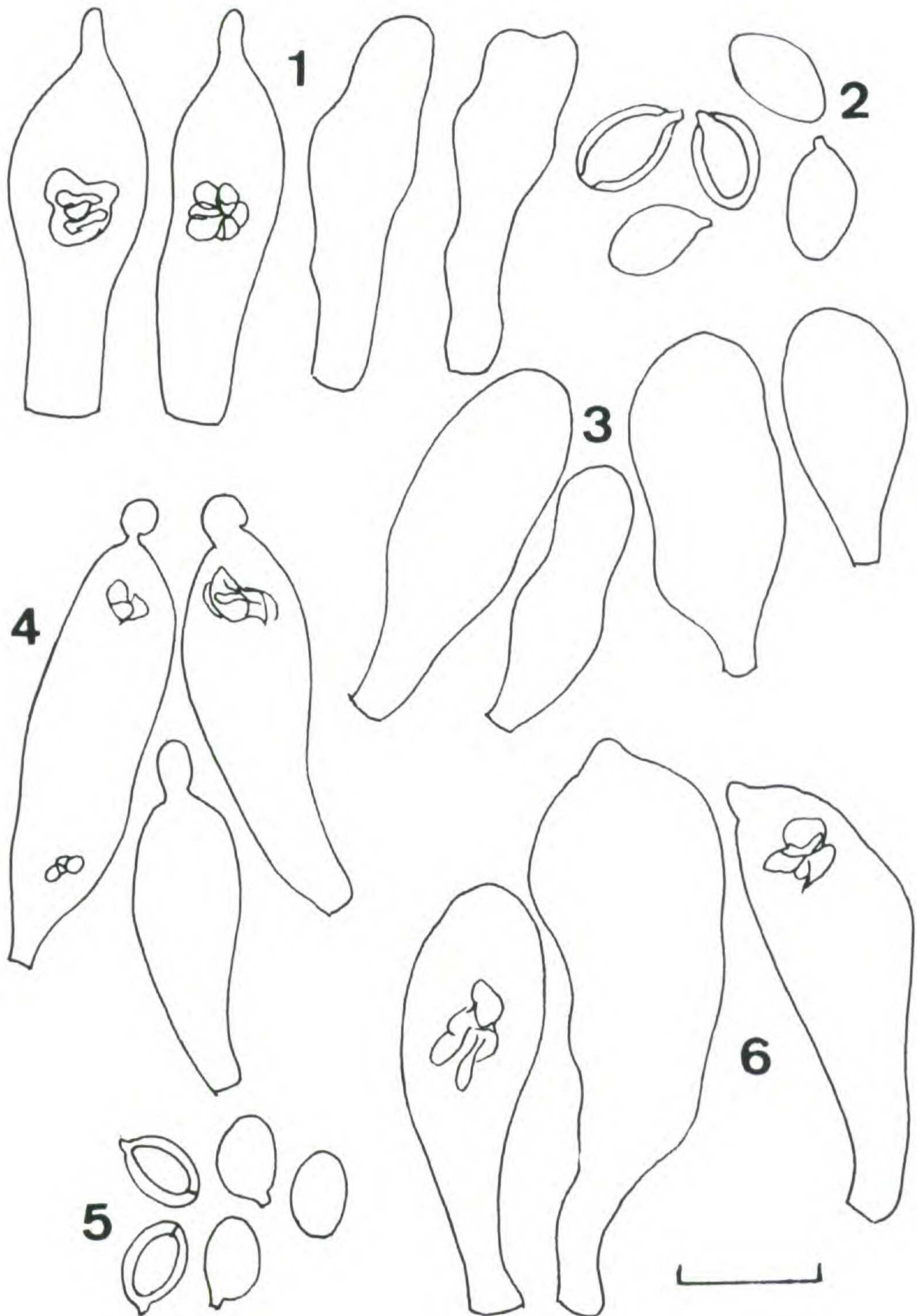
Pileus 2.5–6 cm broad, convex to broadly convex with the margin incurved at first and attached to a partial veil, finally nearly plane, margin not striate but dentate appendiculate from ruptured veil, surface squarrose with scales in 1–3 concentric rings, whitish to cream or buff to pale yellowish, appressed in age, slightly viscid, ground color dull orange (“zinc orange” to “ochraceous orange”); context thin, soft or brittle, watery concolorous with cap or a pale salmon buff or whitish. Odor slightly fragrant or odor and taste absent.

Lamellae broadly adnate with a decurrent tooth, or decurrent, broad (5–10 mm), narrowed at margin, arched when young, close to subdistant, purplish gray to dark purple brown, edges white fimbriate.

Stipe 10–16 cm long, apex 3–8 mm thick, equal or base enlarged and tapering upward, often curved and flexuous, squarrose from base to annulus, scales yellowish to buff, ground color pale ochraceous orange to ochraceous brown, becoming rather shining as scales appressed, white pruinose to furfuraceous above annulus, silky white beneath, solid stuffed (watery buff core, becoming hollow at times, cortex whitish), base slightly enlarged at times and strigose.

Annulus superior, thin, small, whitish with yellowish fibrillose particles on under side, striate on upper side, membranous, projecting to 6 mm.

Spores  $11-14 \times 6-7 \mu\text{m}$ , elliptic, apex truncate and with distinct broad apical pore, smooth, brownish yellow in KOH, small hyaline apiculus. Basidia  $20-32 \times 9-11 \mu\text{m}$ , 4-spored. Cheilocystidia  $55-80 \mu\text{m}$  long,  $3.5-5 \mu\text{m}$  broad, cylindric to narrowly fusoid, wavy and flexuous near base, walls thin. Pleurocystidia absent. Pileus: cutis an ixotrichodermium, hyphae  $1.5-4 \mu\text{m}$  diam, wavy and erect or



Figures 1-6. *Stropharia coronilla*: 1. pleurocystidia; 2. spores; 3. cheilocystidia. *Stropharia hardii*: 4. pleurocystidia; 5. spores; 6. cheilocystidia. Standard line = 10  $\mu$ m.

loosely interwoven, cylindric and branched, yellow with dilute pigment in cell contents; context hyphae cylindric to inflated, 3–16  $\mu\text{m}$  diam, hyaline or yellow. Hymenophoral trama of subparallel hyphae, cylindric, 3.5–7.5  $\mu\text{m}$  diam, hyaline. Oleiferous hyphae present (up to 20  $\mu\text{m}$  diam). Clamp connections present.

Solitary, scattered, or gregarious. On stump or other wood debris. In mixed woods. September.

MATERIAL EXAMINED. **Massachusetts:** *Bigelow 7771 & 15544* (MASS).

This species is placed in *Stropharia* by several workers and indeed its stature and presence of an annulus do recall such species as *S. hardii* and *S. hornemanii*. The diagnostic characters and taxonomic level of *Stropharia* have been in debate for some time, but if the presence of chrysocystidia is considered an essential diagnostic character of *Stropharia*, *P. thrausta* is properly placed in *Psilocybe*.

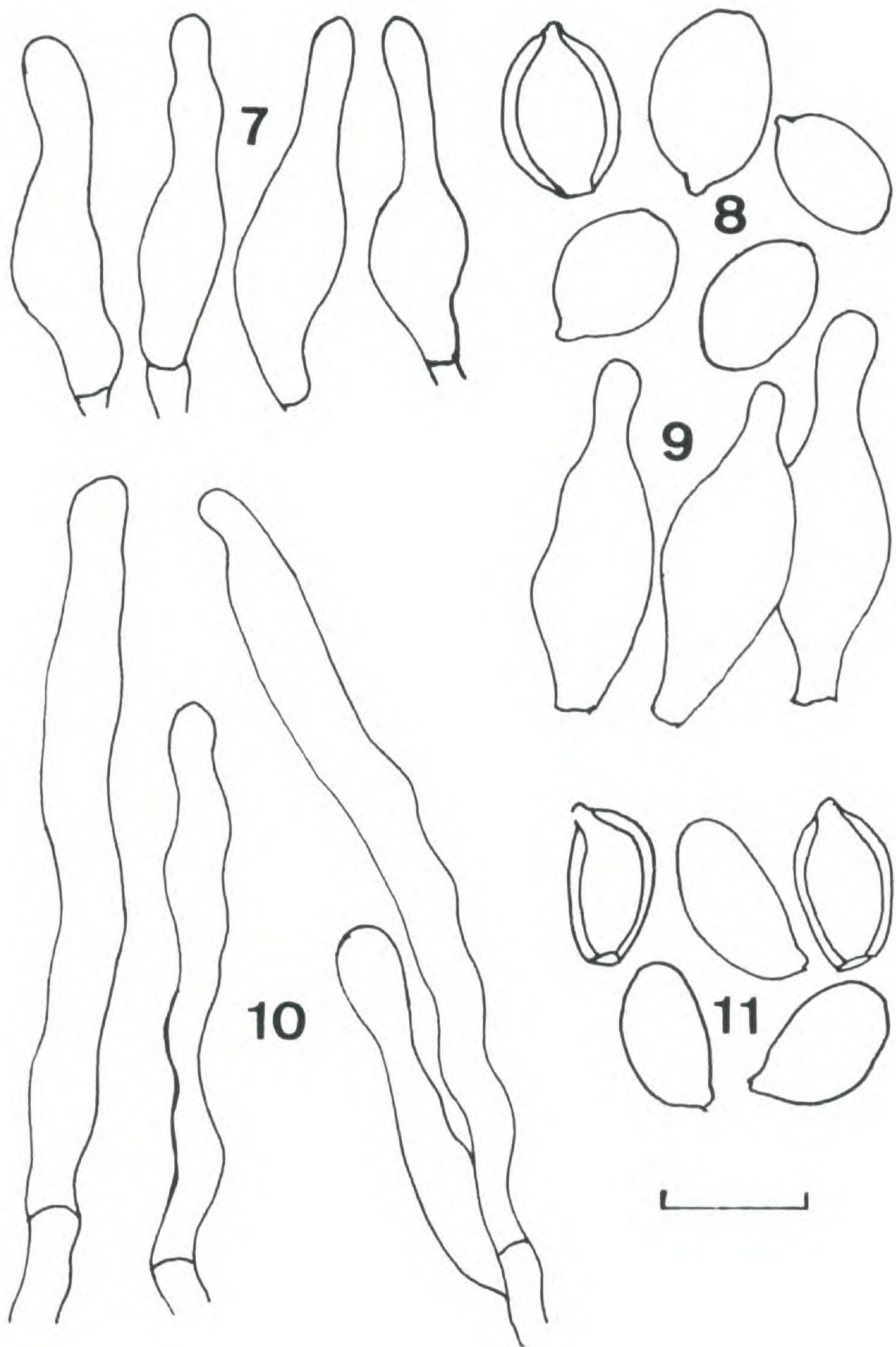
***Psilocybe coprophila*** (Fries) Kummer, *Der Führer in die Pilzkunde*, p. 71. 1871. Figures 7–9.

Pileus up to 12 mm broad, obtuse at first and margin attached to stipe by whitish veil, expanding soon to hemispheric then convex, usually with low broad umbo when mature, surface viscid and hygrophanous, brown (near “ochraceous tawny”) with darker brown striations, fading to buff (near “cream buff”) and then opaque, discolored ochraceous for some time, margin whitish crenate from veil remnants; context thin, concolorous and fading with pileus surface. Odor and taste not distinctive.

Lamellae broadly adnate to short decurrent, subdistant, broad, purple brown, edges white marginate.

Stipe up to 25 mm long and 2 mm thick, equal, surface with whitish fibrillose patches, ground color light brown, base with white tomentum and often a small bulb.

Spores 11.5–13.5(–14.5)  $\times$  7–8(–9)  $\mu\text{m}$ , lentiform and slightly angular, smooth, wall thick (up to 1  $\mu\text{m}$ ), apex truncate and with distinct pore, light violaceous with yellowish cast in KOH. Basidia 19–34  $\times$  8–11  $\mu\text{m}$ , 4-spored. Cheilocystidia abundant, 26–34  $\mu\text{m}$  long, apex 2.5–4  $\mu\text{m}$  thick, base 6–8  $\mu\text{m}$  thick, ventricose rostrate, hyaline, smooth, thin walled, contents granular. Pleurocystidia scattered, similar in shape to cheilocystidia but more robust, apex up to 5  $\mu\text{m}$  thick, base up to 10  $\mu\text{m}$  thick. Pileus: gelatinous pellicle pres-



Figures 7-11. *Psilocybe coprophila*: 7. cheilocystidia; 8. spores; 9. pleurocystidia. *Psilocybe thrausta*: 10. cheilocystidia; 11. spores. Standard line = 10  $\mu$ m.

ent, hyaline in KOH, subpellicular layer light yellowish brown in KOH, pigment finely encrusted, hyphae cylindrical, 2–4  $\mu\text{m}$  diam; context hyphae cylindrical to inflated, 3–15  $\mu\text{m}$  diam, smooth, cells often short. Hymenophoral trama of parallel hyphae, cylindrical or occasionally inflated, (2.5–)5–13  $\mu\text{m}$  diam. Clamp connections present. Gregarious. On horse manure. October.

MATERIAL EXAMINED. **Massachusetts:** *Bigelow 16284* (MASS).

*Psilocybe coprophila* resembles several other species which grow on dung, e.g., *P. subcoprophila* (Britz.) Sacc., *P. subviscida* (Peck) Kauffman, *P. angustispora* Smith, but as far as is known *P. coprophila* is the only one of the group which has pleurocystidia.

***Psilocybe merdaria*** (Fries) Ricken, *Die Blatterpilze*, p. 251. 1915. Figures 12, 13, & 18.

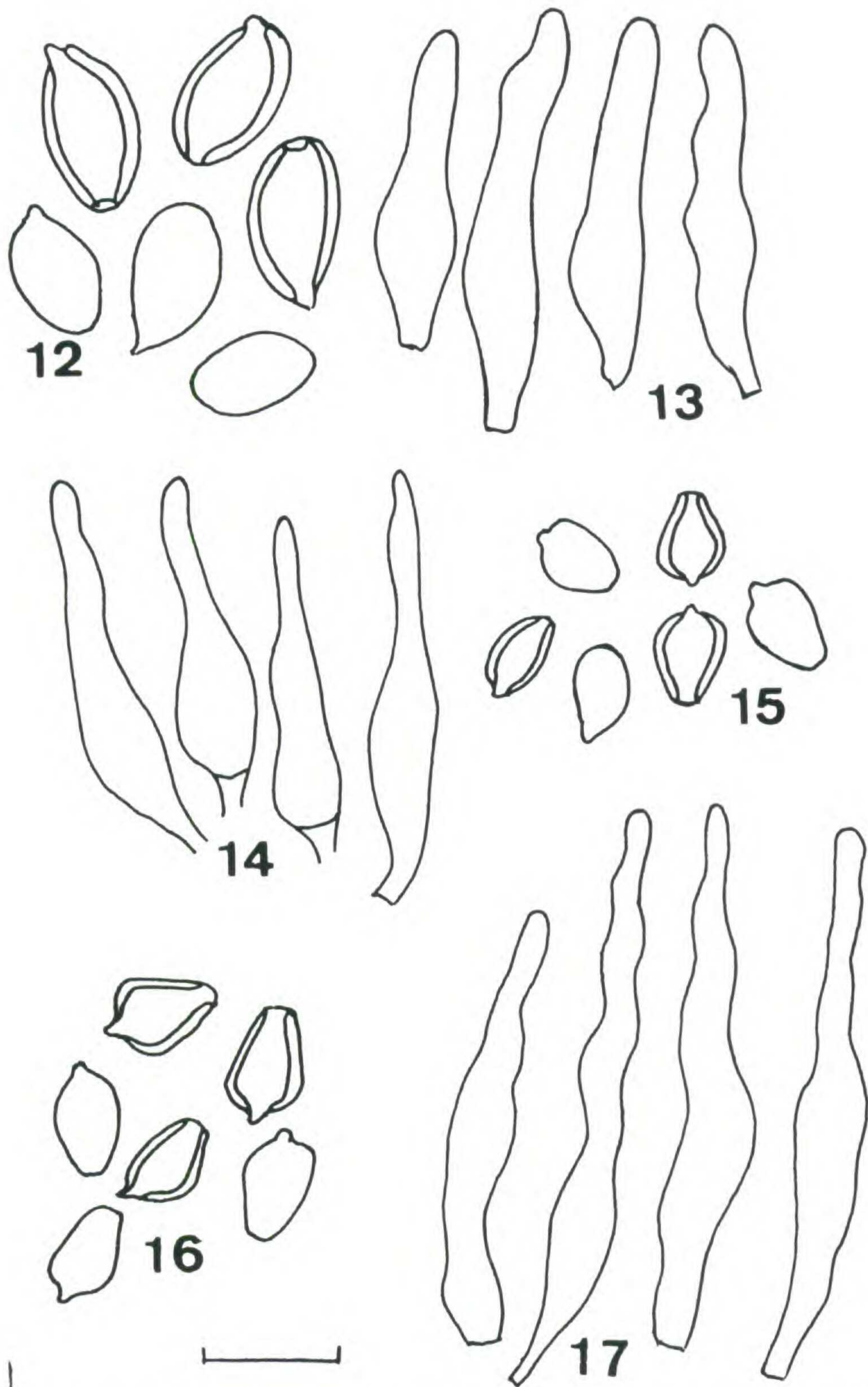
Pileus 5–35 mm broad, obtuse at first with margin connected to stipe by white fibrillose partial veil, expanding to broadly conic then broadly convex, at times subumbonate in largest caps, margin becoming white crenate with rupture of veil, then appressed, not striate, completely glabrous and viscid when expanded, ochraceous at first then paler and yellower (“cream buff,” “Naples yellow,” “maize yellow”), disc sometimes tinged ochraceous, olivaceous tinged when water soaked; context thin, creamy white to yellowish, firm but brittle. Odor fragrant fungoid.

Lamellae broadly adnate to subdecurrent, close, broad (up to 7 mm), subacute at pileus margin, broad at stipe, soft, easily separable from stipe, whitish at first then violaceous gray, finally dark purplish brown to blackish brown, edges crenate to white fimbriate.

Stipe (1–)2–4(–8) cm long, 1–4 mm thick, at times radicate, equal or base slightly enlarged, hollow, fibrous texture, surface heavy silky fibrillose at first and attached near apex to pileus margin by white partial veil, veil rupturing with expansion to give fibrillose zone but no persistent annulus, fibrils appressed and diffracted below with stipe expansion, thinly scabrous in age, white then pale dingy yellowish.

Spores 10–13(–14.5)  $\times$  6.5–8(–9)  $\mu\text{m}$ , elliptic to ovate, slightly angular at times, smooth, dark brown in KOH, wall thick, smooth, apex with pore,  $\pm$  truncate, deposit dark purple brown (“dusky brown”). Basidia 20–28  $\times$  8–10  $\mu\text{m}$ , 4-spored, protruding when mature, sterigmata delicate, short, basidioles short. Cheilocystidia





Figures 12-17. *Psilocybe merdaria*: 12. spores; 13. cheilocystidia. *Psilocybe bullacea*: 14. cheilocystidia; 15. spores. *Psilocybe rhombispora*: 16. spores; 17. cheilocystidia. Standard line = 10  $\mu$ m.

abundant, clustered, cylindric or somewhat ventricose below, 25–40  $\mu\text{m}$  long, 5–8  $\mu\text{m}$  diam in ventricose portion, smooth, hyaline. Pleurocystidia absent. Pileus: cutis an ixotrichodermium, hyphae slender, 0.5–2  $\mu\text{m}$  diam, contorted, subsurface layer with encrusted hyphae, cylindric or slightly inflated, 2–6  $\mu\text{m}$  diam; context hyphae cylindric or inflated, 3–21  $\mu\text{m}$  diam, smooth. Hymenophoral trama of interwoven hyphae, appearing rather cellular, hyphae cylindric to broad cylindric, 3–9(–11)  $\mu\text{m}$  diam, cells short. Clamp connections present.

Gregarious, on cow or horse dung, or straw and dung. In field or near stable. June–August.

MATERIAL EXAMINED. **Massachusetts:** *Bigelow 8109, 9537, & 17070* (MASS); **Quebec:** *Bigelow 6118 & 6143* (MASS).

With fresh specimens, the viscid, light yellow pileus of *Psilocybe merdaria* and its substrate might lead to misidentification as *Stropharia semiglobata* or perhaps even as *Agrocybe pediades*. A microscopic examination is necessary — *S. semiglobata* is conveniently identified by its chrysocystidia and the *A. pediades* group by the cellular pileus cutis.

***Psilocybe bullacea*** (Fries) Kummer, *Der Führer in die Pilzkunde*, p. 71. 1871. Figures 14 & 15.

Pileus 4–12 mm broad, convex or subcampanulate, margin incurved at first, appendiculate with white veil remains for some time, faintly pellucid striate, surface glabrous except at edge, viscid, brown (“mikado brown” at first, then “verona brown” or “snuff brown”); context thin, pliant, concolorous with pileus surface. Odor and taste not distinctive.

Lamellae broadly adnate, broad (up to 5 mm), narrowed at pileus edge, close, violaceous brown (“benzo brown”), edges white fimbriate.

Stipe 1–4 cm long, 1–1.5 mm thick, equal, hollow, tough, apex pruinose, fibrillose (heavy) below, fibrils grayish, ground color cinnamon color.

Spores 6.5–7.5  $\times$  5–6  $\times$  4–4.5(–5)  $\mu\text{m}$ , elliptic to ovate, often angular, wall smooth and thick, apical pore truncate at times, yellowish with purplish cast in KOH. Basidia 17–23  $\times$  5–6.5  $\mu\text{m}$ , 4-spored. Cheilocystidia abundant, 23–35  $\mu\text{m}$  long, 6–7  $\mu\text{m}$  at widest portion, 2  $\mu\text{m}$  at apex, fusoid ventricose to ventricose rostrate,



Figure 18. *Psilocybe merdaria*. Bigelow 17070 (MASS).  $\times 1$ .

smooth, hyaline. Pleurocystidia absent. Pileus: cutis an ixotrichodermium,  $\pm 25 \mu\text{m}$  thick, hyphae within  $\pm 1.5 \mu\text{m}$  thick, subsurface layer dull yellowish in KOH, hyphae cylindric or slightly inflated,  $2.5\text{--}7.5 \mu\text{m}$ , distinctly encrusted; context hyaline, hyphae cylindric to inflated,  $6.5\text{--}11 \mu\text{m}$  diam, smooth, cells often short. Hymenophoral trama of  $\pm$  parallel hyphae, cylindric to inflated,  $4\text{--}20 \mu\text{m}$  diam, hyaline, smooth, cells short. Clamp connections present. Stipe cortex composed of cylindric hyphae,  $2\text{--}6 \mu\text{m}$  diam, spirally encrusted, walls and septa thickened.

Gregarious. On deer pellets in cedar bog. July.

MATERIAL EXAMINED. **Maine:** Bigelow 10423 (MASS).

*Psilocybe subviscida* (Peck) Kauffman differs from this species by the "brownish ferruginous" lamellae. Smith (1948) found pleurocystidia to be present in his study of the type of *P. subviscida*, although he did not think their occurrence to be significant. He also found that the spores were not angled distinctly, and that the pileus did not have distinctive coloration in section.

Another coprophilous species with relatively small spores is *Psilocybe caespitosa* Murrill. It has a larger pileus (1–2.5 cm), grows in a caespitose fashion, but otherwise should closely resemble *P. bullacea* in the field. According to Smith's type study, the species should be distinguishable on microscopic characters for the cheilocystidia are short (22–28  $\mu\text{m}$ ), the spores not angular in face view, and encrusted hyphae are absent in the pileus.

***Psilocybe rhombispora*** (Britz.) Saccardo, Syll. Fung. **11**: 72. 1895. Figures 16 & 17.

Pileus 4–15 mm broad, hemispherical at first with an incurved margin, whitish fibrillose veil present, soon expanding to convex, margin appendiculate with veil remains at first then appressed, not striate, surface glabrous, moist and hygrophorous, a dark vinaceous brown moist (near "auburn," "chestnut brown"), fading to a dingy buff (near dingy "pinkish buff"); context thin, firm, watery appearing and concolorous with moist pileus at first, fading to pale ochraceous buff. Odor absent. Taste slightly bitter.

Lamellae adnate, close, broad (up to 3.5 mm), arched, narrowed at pileus edge, brown (near "snuff brown"), edges straight, white fimbriate.

Stipe 1–2 cm long, apex 1–3 mm thick, enlarged and tapered downward, surface with heavy coating of grayish fibrils, ground color blackish, solid (whitish in center, cortex blackish like surface), central, often curved, base with white mycelium.

Spores 6–7.5(–8.5)  $\times$  5–5.5(–6)  $\times$  3.5(–4)  $\mu\text{m}$ , ovate and angular to lentiform, smooth, wall thick, distinct apical pore, truncate, drab yellow to yellow brown in KOH. Basidia 26–29  $\times$  6–8  $\mu\text{m}$ , 4-spored. Cheilocystidia subcylindric to subventricose and rostrate, 35–50  $\mu\text{m}$  long, apex 2–3  $\mu\text{m}$  diam, ventricose portion 5–6  $\mu\text{m}$  diam, walls thin, hyaline. Pleurocystidia absent. Pileus: cutis an ixotrichodermium, hyphal fragments 1.5–3  $\mu\text{m}$  diam, hyaline, subsurface hyphae cylindric to slightly inflated, 3–10  $\mu\text{m}$  diam, smooth or finely encrusted, cells often short; context hyphae often inflated, 5–15(–33)  $\mu\text{m}$  diam, walls often slightly thickened or very finely encrusted, cells short, tissue yellow brown in KOH. Hymenophoral trama of parallel hyphae, cylindric or somewhat inflated, 4–12  $\mu\text{m}$  diam, walls slightly thickened or finely encrusted, yellowish brown in KOH, cells short. Clamp connections present.

Cespitose, on sawdust and wood chips. July.

MATERIAL EXAMINED. **Massachusetts:** *Bigelow 6934* (MASS).

*Deconica rhomboidospora* Atkinson (Ann. Mycol. 7: 368. 1909.) appears to be closely related, although not identical, to *Psilocybe rhombispora*. The specimens of the type of *D. rhomboidospora* (CUP 18245) have spores (6-)6.5-7 × 4.5-5.5 μm, which are broadly ovate and only slightly angular, and cheilocystidia 30-53 μm long, 2.5-4 μm broad at apex, 5-7.5 μm near the base. The pileus cutis is subgelatinous in sections mounted in KOH, but there is no pellicle as in *P. rhombispora*. *Deconica rhomboidospora* also has encrusted pigments on the pileus hyphae, but these are confined to the cutis. In the field, the species should be distinguishable from *P. rhombispora* by the dry, ochraceous to clay color pileus. Both species grow on wood debris.

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DEPARTMENT OF BOTANY  
UNIVERSITY OF MASSACHUSETTS  
AMHERST, MASSACHUSETTS 01003